

# Flower Power

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**Grade levels:** High school Biology: grades 10 through 12  
Middle School Life Science: Grade 7

**Time allotment:** 2 days

## Overview:

Flowers, the reproductive organs of plants, show amazing variety of sizes, shapes, and colors. The diversity of plants we observe today is the result of millions of years of evolution with their animal partners. Animals obtain food from flowers as they, in turn, carry pollen from plant to plant. Intense competition for the pollinators has also contributed to the great diversity of form and function. While flowers differ greatly, they also share many parts in common including sepals, petals, pistils, stamens, and pollen.

In this activity, a slide show of flower close-ups introduces students to the great diversity of flowers and their essential biological function - reproduction. A short video sequence will guide students through identification of flower parts as well as the functions of each part. How flowers attract pollinators and how competition between flowers for pollinators impacts diversity is also addressed. Student dissection of flowers culminates this exploration.

**Subject Matter:** Biology, (flower structure, plant reproduction)

## Learning Objectives:

- Students will be able to explain flower function.
- Students will be able to identify on a diagram and on real flowers: petals, calyx, sepal, corolla, stamen, anther, pollen, ovary, stigma, and style.
- Students will be able to identify ways pollen moves from one plant to another.
- Students will be able to explain why there is such great diversity in flower structure and function.

## Standards:

From the Virginia Learning Standards for Biology, available on-line at  
<http://www.pen.k12.va.us/VDOE/Superintendent/Sols/home.shtml>

- BIO.1 The student will plan and conduct investigations in which
- a) observations of living organisms are recorded in the lab and in the field;
  - b) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data and communicating results;

- BIO.2 The student will investigate and understand the history of biological concepts. Key concepts include
- a) scientific explanations of the development of organisms through time (biological evolution);
- BIO.5 The student will investigate and understand life functions of archaeobacteria, monerans (eubacteria), protists, fungi, plants, and animals including humans. Key concepts include
- a) how their structures and functions vary between and within the kingdoms;
- BIO.8 The student will investigate and understand how populations change through time. Key concepts include
- a) how genetic variation, reproductive strategies, and environmental pressures impact the survival of populations;
- BIO.9 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include
- a) analysis of the flora, fauna, and microorganisms of Virginia ecosystems including the Chesapeake Bay and its tributaries.

- LS.3 The student will investigate and understand that living things show patterns of cellular organization. Key concepts include
- a) functions and processes of cells, tissues, organs, and systems (respiration, removal of wastes, growth, reproduction, digestion, and cellular transport).

- LS.5 The student will investigate and understand classification of organisms. Key concepts include
- a) differences in number, color, size, shape, and texture of external and internal structures;
  - b) variation in method of locomotion, obtaining nourishment, and reproduction.

- LS.8 The student will investigate and understand that interactions exist among members of a population. Key concepts include
- a) competition, cooperation, social hierarchy, territorial imperative

- LS.9 The student will investigate and understand interactions among populations in a biological community. Key concepts include
- a) competition and cooperation;
  - b) symbiotic relationships and niches.

- LS.13 The student will investigate and understand that organisms reproduce and transmit genetic information to new generations.

### **Media Components:**

#### Video:

From the United Streaming Web Site ([www.unitedstreaming.com](http://www.unitedstreaming.com));  
*Plant Parts We Eat: Leaves and Flowers*. "What is a Flower?" (02:08)  
*World of Plants, The: Our Flowering World* (13:33).

### Web Sites:

Flower Slide Show

<http://community.webshots.com/photo/15815940/30502308OhJlgHlluT>

This site allows one to choose a slide show that provides close-ups of twenty-five different flowers. Each flower is shown for two to five seconds.

Flower Structure Labeling Game

<http://www.botany.uwc.ac.za/ecotree/flowers/flowerparts.htm#top>

This site allows students to play an interactive game where they label the parts of a flower.

### Materials:

For each student:

- Paper and pencil
- Identifying Flower Parts sheet
- Dissecting Flowers Lab sheet

### Prep for teachers:

- Prior to beginning this lesson, download video clips from the United Streaming Web Site in advance.
- Collect flowers from the school lawn, local fields, empty lots, along fencerows or roadsides, or purchase at local florist. Collect three flowers for each student or pair of students.
- Make one copy for each student:
  - 1) Identifying Flower Parts sheet
  - 2) Dissecting Flowers Lab sheet

When using media, provide students with a **FOCUS FOR MEDIA INTERACTION**, as a specific task to complete and/or information to identify during or after viewing of video segments, web sites, or other multimedia elements.

### Introductory Activity:

Step 1. Provide students with a **FOCUS FOR MEDIA INTERACTION** by saying to students: "I want you to watch this slide show that shows many different flowers and think about how all these flowers are similar and how these flowers are different." Go to the web site at the following address:

<http://community.webshots.com/photo/15815940/30502308OhJlgHlluT>

**CLICK** on VIEW SLIDE SHOW. **SELECT** 2 seconds for the time frame between slides. **PLAY** the slide show.

Step 2. **Ask** students: "What were some of the ways the flowers were similar?" (*Answers will vary*). **Ask** students: "What were some of the ways the flowers were different?" (*Answers will vary*.)

Step 3. **Say** to students: “Take out a sheet of paper and write an answer to the following question: Exactly what is the biological function or purpose of flowers?” Allow students time to write their answer.

Step 4. Provide students with a **FOCUS FOR MEDIA INTERACTION** by saying to students: “I want you to watch this video clip and evaluate your answer to the function of flowers. Make notes on any additional information you can add to your answers.” Select the video clip from the United Streaming Web Site: “What is a Flower?” (02:08) which is a subtitle in *Plant Parts We Eat: Leaves and Flowers*. **PLAY** the video clip and **Pause** at 0:46. Discuss the function of flowers with students after watching the clip. Check for comprehension. (*Students should include in their answers that the function of flowers is reproduction. Flowers have male sex organs called stamens that produce pollen. Flowers also have female sex organs called pistils. Pollen from male part (stamen) must be carried to the female part (pistil) to produce fertilized seeds.*)

### **Learning Activity:**

Step 1. Hand out the “Identifying Flower Parts” sheet. Explain to students that they will be learning to identify flower parts in this activity. (see attached sheet at end of lesson)

Step 2. Provide students with a **FOCUS FOR MEDIA INTERACTION** by saying to students: “I want you to watch this video clip and after I click on pause be able to tell me what is unusual about flowers when compared to animals and what are two main parts of many flowers.” Select the video clip from the United Streaming Web Site: *World of Plants, The: Our Flowering World* (13:33). CUE the video clip to 1:52 and press **PLAY**. **PAUSE** at 2:25. **Ask** students: “What does the lily have that is typical of many flowering plants but would be very unusual in an animal?” (*Lilies have both male and female parts.*) “What is the female part called?” (*Stamen*) “What is the male part called?” (*Pistil.*) Ask students to label these parts on their diagram. Check for comprehension.

Step 3. Provide students with a **FOCUS FOR MEDIA INTERACTION** by saying to students: “I want you to watch this next part of the clip and be ready to label the parts of the stamen or male part of plants.” **PLAY** the video and **PAUSE** at 3:44. Ask students to label the anther and pollen on their diagram. Check for comprehension. Tell students to label the long stalk of the stamen that ends with the anther – “filament”. This part was not mentioned in the video clip.

Step 4. Provide students with a **FOCUS FOR MEDIA INTERACTION** by saying to students: “I want you to watch the next part of the video clip and be ready to label the parts of the pistil or female part of plants.” **PLAY** the video and **PAUSE** at 4:01. Ask students to label the stigma, style, and ovary on their diagrams. Check for comprehension.

Step 5. Ask students to label the other parts of flowers – sepal, calyx, petals and corolla (This information was NOT provided in the video -- see key provided in “Student Materials”). Explain to students that the calyx includes all the individual sepals. The

sepals are the outer covering of a flower bud. The function of the sepals is to protect the developing flower parts. The corolla is all of the individual petals together.

Step 6. Provide students with a **FOCUS FOR MEDIA INTERACTION** by saying to students: “I want you to watch the next part of this video clip and be able to answer the following question: What must happen for a flowering plant to successfully produce seeds?” **PLAY** the video and **PAUSE** at 4:33. Check for comprehension. *(For a flowering plant to successfully produce seeds the pollen from the anther of one flower must reach the pistil of another flower.)*

Step 7. Provide students with a **FOCUS FOR MEDIA INTERACTION** by saying to students: “Exactly what happens after pollen lands on pistil?” **PLAY** the video and **PAUSE** at 5:01. Check for comprehension. *(A long tube grows down from the pollen grain to the ovary. Male genetic material moves down the tube and combines with the ovule. The fertilized ovule then develops into a seed.)*

Step 8. Provide students with a **FOCUS FOR MEDIA INTERACTION** by saying to students: “How does pollen get from the stamen of one plant to the stigma of another?” **PLAY** the video and **PAUSE** at 6:08. Check for comprehension. *(Plants rely on wind or insects, birds, and other animals to carry pollen from plant to plant.)*

Step 9. Provide students with a **FOCUS FOR MEDIA INTERACTION** by saying to students: “Why do animals carry the pollen from flower to flower? What benefit do they get from this relationship?” **PLAY** the video and **PAUSE** at 7:24. Check for comprehension. *(Animals get food from this relationship including nectar or pollen. The pollen, which is often picked up on the animal’s body, is accidentally moved from plant to plant by the pollinator)*

Step 10. Ask students to recall the variety of flower types they saw in the slide show which introduced this activity as well as the variety of flowers they have seen themselves. Ask students why there are so many different kinds of flowers. Encourage brainstorming and open-ended thinking as students address this question. *(Answers will vary. The answer involves the biological principle of competition. Plants are competing with each other for a limited number of pollinators.)* Ask students to work in small groups and list all the different ways plants attract pollinators and try to out compete each other. Allow students 10 minutes to develop their lists, then share answers with class. *(Answers will vary: different colors, brighter colors, larger petals, petals shaped like potential mates, petals shaped into landing pads, strong sweet scents, sweeter nectar, some attract flies with rancid smelling odors, are some of many possible answers.)*

Step 11. Finally, you may wish to conclude the learning activity with a discussion about the differences between wind pollinated flowers and insect pollinated flowers. Ask students to consider how a flower pollinated by wind might be different from a flower pollinated by insects. Ask students if petals, bright colors, and scents would be necessary for wind pollinated flowers. Ask students what might be other features of wind pollinated flowers. *(Wind pollinated flowers do not have bright showy petals and have*

*small inconspicuous green flowers. Wind pollinated flowers produce large amounts of light weight pollen. Insect pollinated flowers have bright showy petals and tend to produce relatively small amounts of sticky pollen.)*

**Culminating Activity:**

1) Instruct students to go to the following web site and play the game.

<http://www.botany.uwc.ac.za/ecotree/flowers/flowerparts.htm#top>

2) Provide each student a Dissecting Flower Lab sheet and three different flowers to dissect. Instruct students to count the numbers of each flower part -- sepals, petals, stamens, and pistils. Instruct students to make a detailed drawing of each flower part. Begin by peeling back sepals and then the petals. Use a scalpel to cut out pistils and stamens. Use magnifying glass and/or microscope to look closely at each part. Optional: Instruct students to use the digital blue microscope to record a snap shot of each part. Label each slide. Assemble slides together for a slide show.

**Cross-curricular Extensions:**

**LANGUAGE ARTS**

Write a story about a pollen grain as it begins its journey from the anther to growing a tube down the pistil. Use scientifically accurate details but write as a children's story.

**MATHEMATICS**

Use geometric principles of symmetry including bilateral symmetry and radial symmetry to describe overall structure and arrangement of flower parts.

**TECHNOLOGY**

Make an animated power point presentation showing anatomy of the different flowers dissected using snap shots recorded by the digital blue microscope

**SOCIAL STUDIES**

Research the importance of the bee industry to pollinating local crops such as apples or peaches.

**VISUAL ART**

Make detailed drawings or paintings that are aesthetically pleasing but show the details of flower anatomy as well.

**Community Connections:**

- Research the importance of insect pollination in local crops.
- Invite a local bee keeper to come to your class and do a presentation on bee-keeping.
- Call your local health department and find out which local plants pose the greatest problems for allergy sufferers. Research eradication efforts for plants like ragweed which produce enormous amounts of wind blown pollen.

**Student Materials:**

- Identifying Flower Parts sheet
- Dissecting Flowers Lab sheet

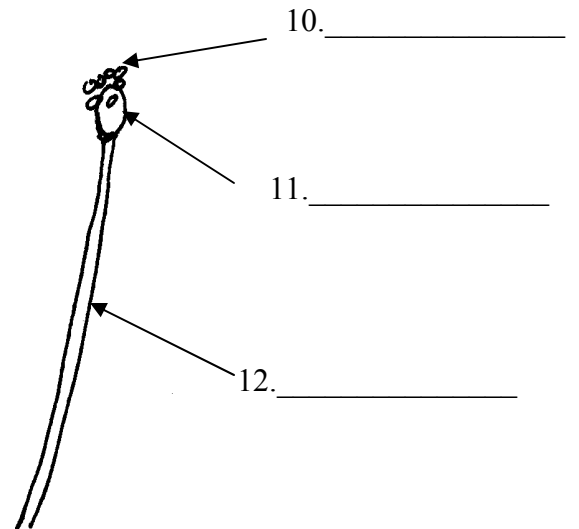
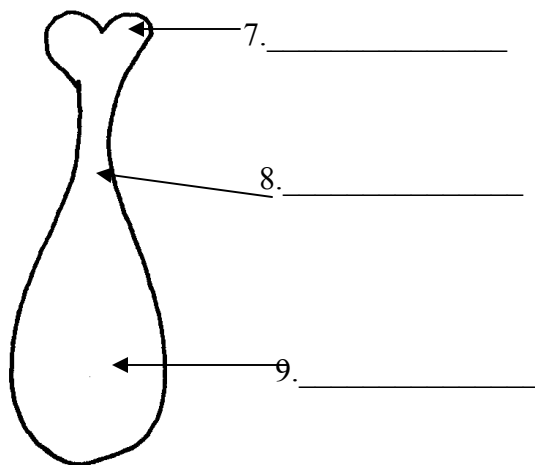
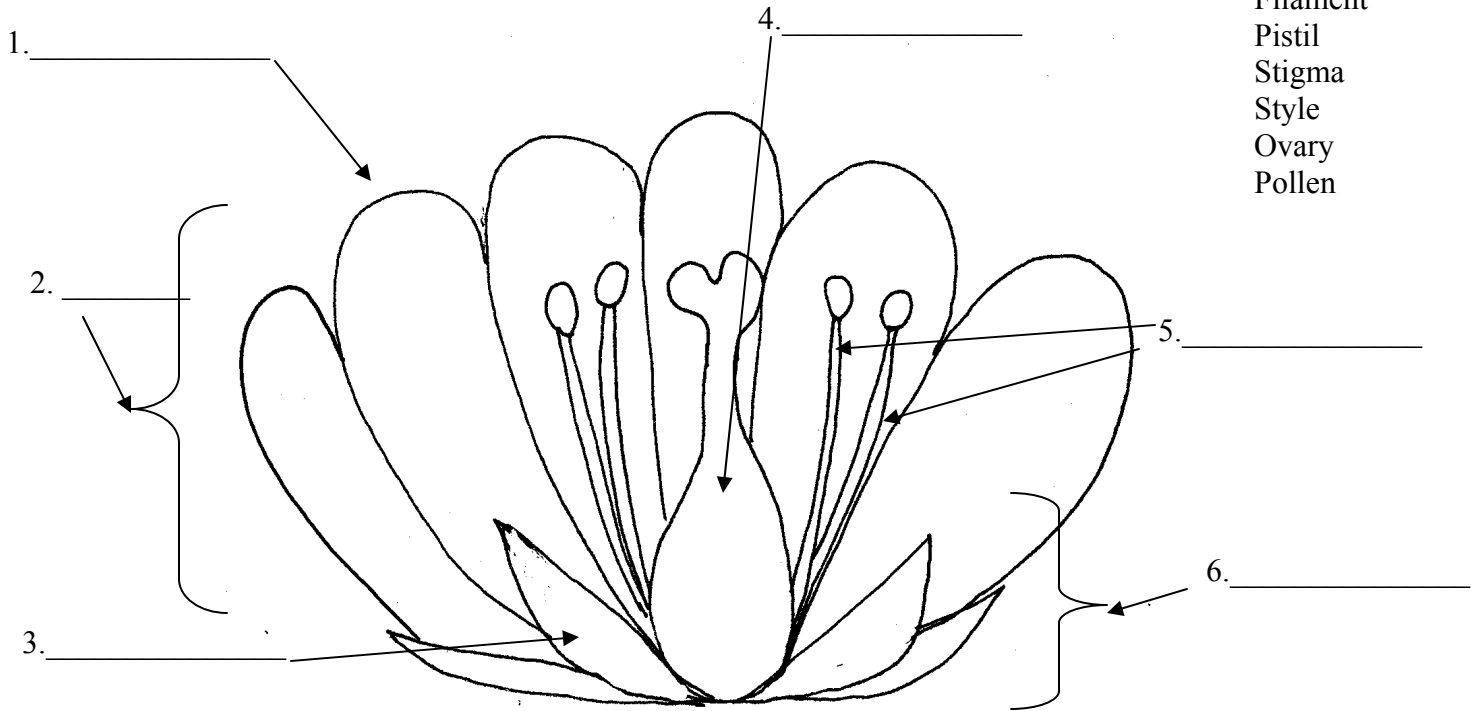
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## Identifying Flower Parts

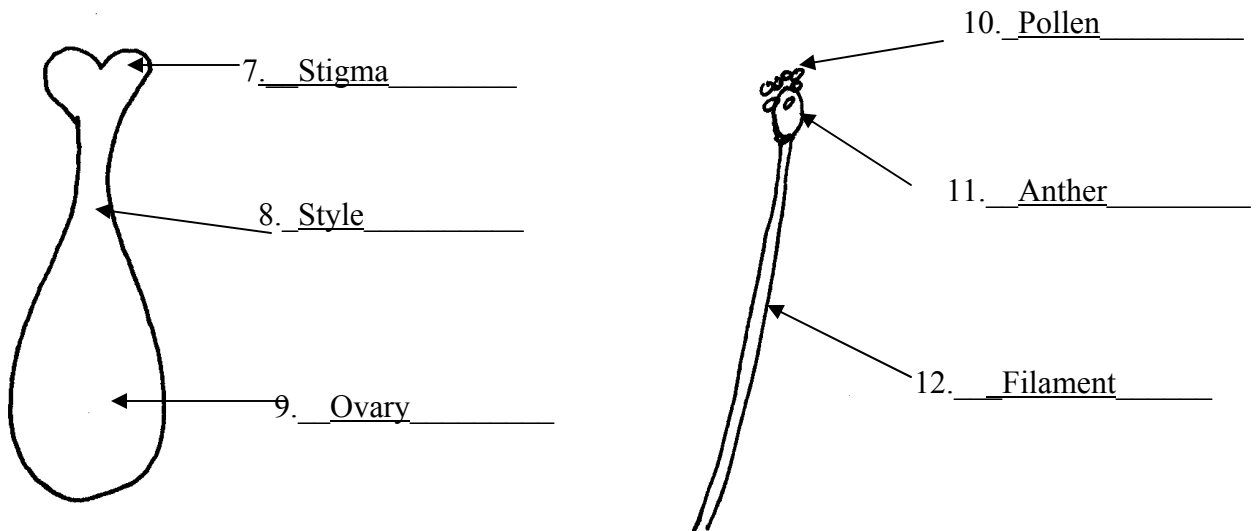
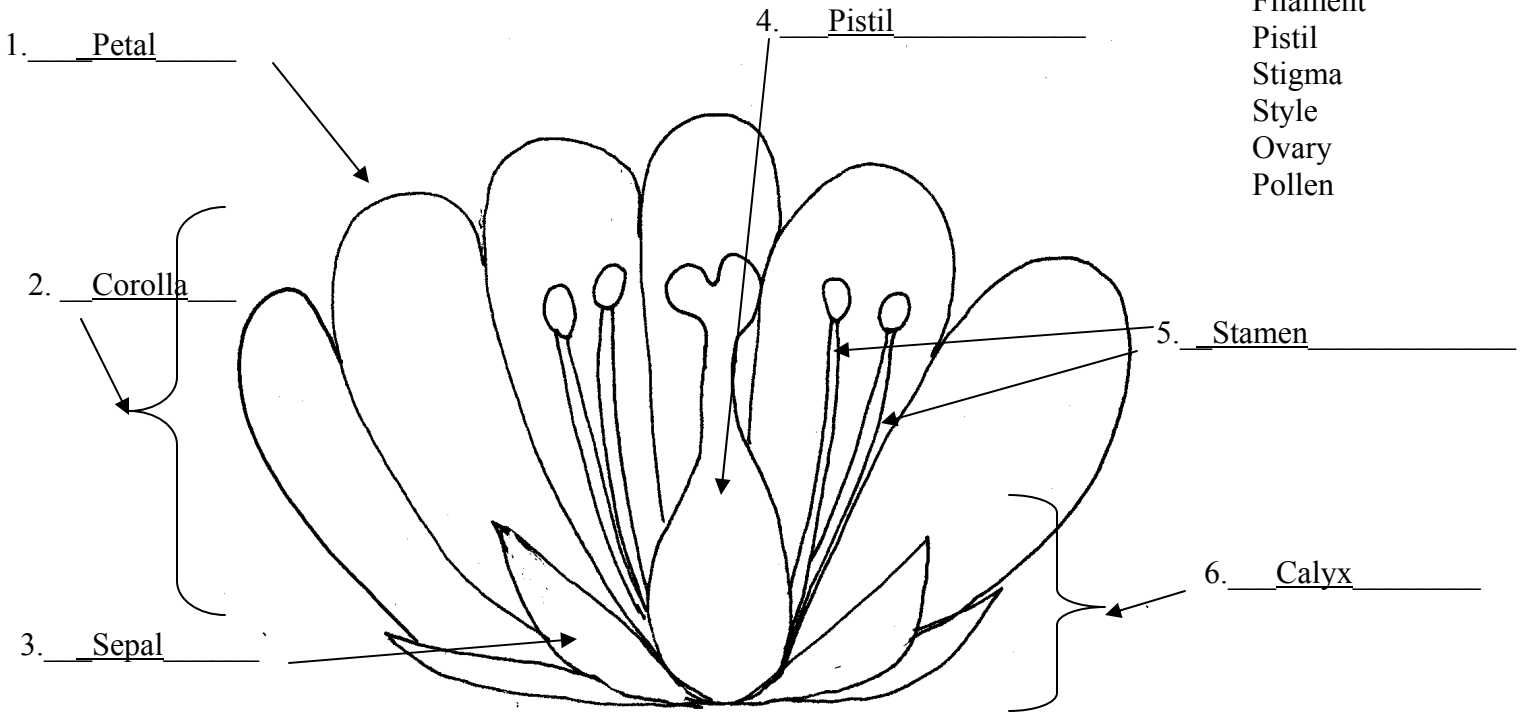
Petal  
Corolla  
Sepal  
Calyx  
Stamen  
Anther  
Filament  
Pistil  
Stigma  
Style  
Ovary  
Pollen



# Answer Key

## Identifying Flower Parts

Petal  
Corolla  
Sepal  
Calyx  
Stamen  
Anther  
Filament  
Pistil  
Stigma  
Style  
Ovary  
Pollen



Name: \_\_\_\_\_

Period: \_\_\_\_\_

Date: \_\_\_\_\_

### DISSECTING FLOWER PARTS

| <b>Flower Part</b>                                           | <b>Flower #1</b> | <b>Flower #2</b> | <b>Flower #3</b> |
|--------------------------------------------------------------|------------------|------------------|------------------|
| <b># of sepals</b>                                           |                  |                  |                  |
| <b># of petals</b>                                           |                  |                  |                  |
| <b># of stamens</b>                                          |                  |                  |                  |
| <b>#of pistils</b>                                           |                  |                  |                  |
| <b>Drawing of sepal</b>                                      |                  |                  |                  |
| <b>Drawing of petal</b>                                      |                  |                  |                  |
| <b>Drawing of one stamen</b><br>(Label anther and filament)  |                  |                  |                  |
| <b>Drawing of pistil</b><br>(label stigma, style, and ovary) |                  |                  |                  |
| <b>Drawing of Pollen grains</b>                              |                  |                  |                  |